

REMARKS

Status of the Claims

Claims 1-4 and 11-24 are pending, claims 5-10 having been cancelled without prejudice or disclaimer and claim 24 having been added by the above amendment. Claims 18-23 are withdrawn as being drawn to a non-elected invention.

The contents of claim 6 have been incorporated into claim 1. Thus, claim 6 has been deleted, and claims 11-15, which previously depended from claim 6, have been amended to depend from claim 1. “At least two” has been removed from claim 1, as it is redundant in view of the open-ended “comprising” language of claim 1. Other claim amendments are self-explanatory.

Support for new claim 24 can be found, for example, in original claims 3, 12 and 15.

Election/Restriction

Applicants hereby confirm the election with traverse of Group I, claims 1-17. Election is made with traverse, because it is believed that a search and examination of the entire application can be made without serious burden.

Claim Rejections – 35 USC § 112

Claims 1-17 are rejected under 35 USC §112, second paragraph. The Office Action asserts that the claims are indefinite, because it is unclear whether the series of the two process steps comprises only isotropic plasma etching or a combination of isotropic and anisotropic plasma etching steps.

It is respectfully submitted that this rejection is now moot in view of the above amendment to claim 1. Reconsideration and withdrawal of claims 1-17 under 35 USC §112, second paragraph, are therefore respectfully requested.

Claim Rejections – 35 USC § 102(b)

Claims 1, 3-7 and 11 are rejected under 35 USC § 102(b) as being anticipated by U.S. Patent No. 6,103,585 to Michaelis et al. (hereinafter “Michaelis”). The Applicants respectfully traverse this rejection and its supporting remarks.

“To anticipate, every element and limitation of the claimed invention must be found in a single prior art reference, arranged as in the claim.” *Brown v. 3M*, 265 F.3d 1349, 60 USPQ2d 1375 (Fed. Cir. 2001).

Claim 1, the only non-withdrawn independent claim in the present application, reads as follows:

1. A method for etching a capacitor structure within a silicon substrate, said method comprising:

providing a masked substrate comprising a patterned masking layer over said silicon substrate, said patterned masking layer having at least one aperture formed therein;

performing a series of process steps upon said silicon substrate through said at least one aperture in said patterned masking layer, said series of process steps comprising (a) an isotropic plasma etching step in which said silicon substrate is etched; and (b) a plasma deposition step in which a passivating layer is deposited on said silicon substrate; and

repeating said series of process steps until a desired etch depth for said capacitor structure is achieved, wherein said capacitor structure comprises an etched sidewall with an undulating profile that has an increased surface area relative to a smooth sidewall.

Hence, claim 1 requires the repetition of a series of process steps which comprise: (1) an *isotropic plasma etching* step and (2) a *plasma deposition* step, to produce a capacitor structure comprising an etched sidewall that has an undulating profile. An example of one such structure is schematically illustrated in Fig. 13 of the present application.

Michaelis, on the other hand, is fundamentally different from claim 1 in that this reference teaches a variation in wafer temperature, a variation in the ratio of gas species, and/or a variation in chamber pressure, preferably a variation in wafer temperature, to alternate between a relatively *aniosotropic etching* step and a relatively *isotropic etching* step to provide a “multiple waist trench.” See, e.g., col. 4, lines 4-38. Note from the description spanning col. 3, line 59 to col. 4, line 18 of Michaelis, that NF₃ and HBr etching gases are added to the gas mixture to suppress the deposition due to helium-oxygen within the overall reactive ion etching process that is being described, with the ratio of these gases rendering the etching more isotropic or more anisotropic as needed.

Thus, while the invention as presently claimed in claim 1 alternates between (a) *etching* and (b) *deposition*, Michaelis is fundamentally different in that it teaches a series of

process steps that alternate between (a) a first type of *etching* and (b) a second type of *etching*.

For at least the above reasons, it is respectfully submitted that claim 1 is patentable over Michaelis. Moreover, claims 3, 4 and 11, which depend from claim 1, are patentable over Michaelis as well. Claims 5-7 have been deleted.

Accordingly, reconsideration and withdrawal of the rejection of claims 1, 3-7 and 11 under 35 U.S.C. 102(b) as being unpatentable over Michaelis are respectfully requested.

Rejection of Claims 2, 8-10, 12 and 16-17– 35 USC § 103(a)

Claims 2, 8-10, 12 and 16-17 are rejected under 35 USC §103(a) as being unpatentable over Michaelis in view of U.S. Patent No. 6,191,043 to McReynolds (hereinafter “McReynolds”). The Applicants respectfully traverse this rejection and its supporting remarks.

In order to establish a *prima facie* case of obviousness under 35 U.S.C. §103, (a) there must be some suggestion or motivation to modify/combine the references of record, and (b) there must be a reasonable expectation of success. See MPEP §2143. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *Id.*

As noted above, claim 1 is unobvious in view of Michaelis because, *inter alia*, Michaelis neither teaches nor suggests the repetition of a series of process steps which comprise: (1) an *isotropic* plasma *etching* step and (2) a plasma *deposition* step, to produce a capacitor structure comprising an etched sidewall that has an undulating profile.

McReynolds does not teach nor suggest such a process and therefore does not make up for the above-noted deficiencies in Michaelis. In fact, McReynolds, which is directed to a method for etching deep openings with *straight vertical sidewalls* (see, e.g., Figs. 5A and 5B, and the associated discussion at col. 5 of McReynolds), actually teaches away from the invention claimed in claim 1 in which an *undulating profile* is produced that has an increased surface area relative to a smooth sidewall. As a result, it is respectfully submitted that claim 1 is patentable over Michaelis in view of McReynolds for at least this reason.

Dependent claims 2, 12 and 16-17 depend from claim 1 and are therefore patentable over Michaelis in view of McReynolds for at least the same reasons. Claims 8-10 have been deleted.

Reconsideration and withdrawal of the rejection of claims 2, 8-10, 12 and 16-17 under 35 USC §103(a) as being unpatentable over Michaelis in view of McReynolds are therefore requested.

Rejection of Claims 13-15– 35 USC § 103(a)

Claims 13-15 are rejected under 35 USC §103(a) as being unpatentable over Michaelis in view of U.S. Patent No. 6,284,148 to Laermer et al. (hereinafter “Laermer”). The Applicants respectfully traverse this rejection and its supporting remarks

As previously noted, claim 1 is unobvious in view of Michaelis, *inter alia*, because Michaelis neither teaches nor suggests the repetition of a series of process steps which comprise: (1) an *isotropic* plasma etching step and (2) a plasma deposition step, to produce a capacitor structure comprising an etched sidewall that has an undulating profile.

Laermer, which is directed to a method for requiring *anisotropic* etching of silicon (see, e.g., Title and Abstract or Laermer), neither teaches nor suggests such a process and thus does not make up for the above-noted deficiency in Michaelis. Therefore, claim 1 is patentable over Michaelis in view of Laermer for at least this reason.

Claims 13-15 depend from claim 1 and are therefore patentable over Michaelis in view of Laermer for at least the same reasons as well.

Reconsideration and withdrawal of the rejection of claims 13-15 under 35 USC §103(a) as being unpatentable over Michaelis in view of Laermer are therefore requested.

CONCLUSION

Applicants submit that the claims of the present invention are in condition for allowance, early notification of which is earnestly solicited. Should the Examiner be of the view that an interview would expedite consideration of this Amendment or of the application at large, request is made that the Examiner telephone the Applicant's attorney at (703) 433-0510 to resolve any outstanding issues.

FEES

The Office is authorized any required fees to deposit account number 50-1047.

Respectfully submitted,



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